



## Full length article

## Social responses to Facebook status updates: The role of extraversion and social anxiety

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## ABSTRACT

Posting, reading, and responding to status updates is an integral part of many peoples' daily lives. However, the role of personality in predicting social responses to status updates remains largely unexplored. Based on the social enhancement and the social compensation hypothesis, we assessed the role of extraversion and social anxiety in predicting social responses to status updates. Moreover, we explored the influence of valence in this context. Capitalizing on the assets of a multimethod approach, personality was assessed with self-reports, and valence was evaluated by independent raters. Social responses to status updates were captured (1) by observing direct social feedback (i.e. likes and commenters) and (2) by informant reports on the interpersonal appraisal of participants' status updates by their friends. In a German and a US sample, for direct social feedback neither extraversion nor social anxiety emerged as significant predictors. However, analyses of the informant reports showed that status updates of more socially anxious individuals were appreciated more by their friends. Furthermore, results pointed to the importance of valence in this context; revealing associations between valence and direct social feedback, valence and extraversion, and a moderation effect of personality on the association between valence and likes in the US sample.

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## 1. Introduction

By now online communication is an integral part of many peoples' everyday lives and often important social relationships are primarily maintained online (Burke, 2011; Winter et al., 2014). Since online communication plays such a major role in our social lives, differences between face-to-face and online communication have prompted the question whether personality traits like extraversion and social anxiety that are associated with sociability and social competence *offline* similarly shape social interactions *online* (Valkenburg & Peter, 2009). In this context, two prominent hypotheses have emerged: the social enhancement and the social compensation hypothesis. The social enhancement or “the-rich-get-richer” hypothesis is based on the idea that online communication offers “just another opportunity” for social interaction (Moore & McElroy, 2012). Therefore, as in the offline world, online communication should mainly serve socially competent individuals

(Kraut et al., 2001). On the other hand, the social compensation or “the-poor-get-richer” hypothesis argues that the internet is not just an extension of the offline world but that, instead, due to unique characteristics of online communication like, for instance, the absence of nonverbal cues and the increased control over self-presentation, it caters better to the needs of less socially skilled individuals (Moore & McElroy, 2012; Valkenburg & Peter, 2007). While this question has been assessed on a global level for general internet or social media usage (e.g. Indian & Grieve, 2014; Kraut et al., 2001) as well as for some specific forms of online communication like online chatting (e.g. Sheeks & Birchmeier, 2007; van Zalk et al., 2011), empirical evidence hardly exists for Facebook status updates. Facebook status updates are particularly interesting as they popularized a new type of communication – so called “masspersonal communication” (O’Sullivan, 2003). They address audiences larger than usual in both offline and online interpersonal communication (median audience for Facebook posts: 78 friends, Bernstein, Bakshy, Burke, & Karrer, 2013) while their content is more personal than that of classical mass communication like newspaper articles. With around 400 million status updates posted each day (Pring, 2012) status updating is a very popular form of

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online communication and it is important to understand whether and how individuals depending on their personality might get socially “richer”. Hence, the present paper aims to address this gap in the literature and assesses the social enhancement and the social compensation hypothesis for status updating by exploring the role that extraversion and social anxiety, as two core interpersonal individual differences, play in predicting social responses to Facebook status updates.

### 1.1. Extraversion and social anxiety

Extraversion, as one of the “Big Five” personality traits and has often been the focus in research on personality and online communication (e.g. Kraut et al., 2001; Zywicka & Danowski, 2008; van Zalk et al., 2011). Individuals high in extraversion can be described as energetic, assertive, outgoing, enthusiastic, and adventurous (John & Srivastava, 1999). Unsurprisingly, social anxiety is negatively associated with extraversion (Ebeling-Witte, Frank, & Lester, 2007; Kotov, Gamez, Schmidt, & Watson, 2010; Norton, Cox, Hewitt, & McLeod, 1997). However, the concept of social anxiety is less broad and exclusively relevant to the social domain (Briggs, 1988). Individuals high in social anxiety are characterized by a desire to convey a positive impression on others while believing that they lack the ability to achieve that (Schlenker & Leary, 1982). Hence, while socially anxious individuals often avoid social interaction to prevent failure, they are not necessarily less interested in social contact and might only appear less sociable (Brown, Silvia, Myin-Germeys, & Kwapil, 2007). As a consequence, social anxiety particularly sparked interest in the context of the social compensation hypothesis (e.g., Caplan, 2007; McKenna & Bargh, 1999).

### 1.2. Social responses to status updates

When Facebook friends read a status update, they can provide direct social feedback in form of expressing a “liking” by clicking the famous, evolved cultural icon, the thumb-up like-button or by writing a verbal comment in response. Hence, the number of likes a status update received as well as the number of friends who post a comment in response constitute objective measures of social feedback directly and uniquely tied to a status updates. Importantly, these measures can be collected unobtrusively from Facebook by accessing the poster's profile page which we did in the present research.

#### 1.2.1. Likes

Likes as one-click-communication require almost no effort (Burke & Kraut, 2014). First and foremost, they signal that the friend wants to express a positive response to the status update. But sad (e.g., sharing of obituaries) or angry (e.g., complaints about inappropriate behavior) status updates can receive likes as well. Therefore, the meaning of likes has probably evolved to mimic comparably effortless and common cues in face-to-face communication like smiles and nods. These non-verbal cues indicate agreement, sympathy, friendliness, and involvement (Siegman & Feldstein, 1987). Accordingly, Utz (2015) found that if friends liked a status update they also indicated that the status update had made them feel more connected to the poster.

#### 1.2.2. Commenters

In comparison to likes, comments require more time and cognitive effort and hence, convey a deeper interest (Burke & Kraut, 2014; Schöndienst & Dang-Xuan, 2011). Moreover, because they are generally verbal (i.e., text-based; conceivably a comment could consist exclusively of emoticons), they should typically provide

richer feedback and social or informational support. They could also contain self-disclosure by the posters' friends and start conversations between the poster and the commenters (Burke & Kraut, 2014). Even though comments can be negative, empirical research shows that almost all comments are positive (88% of all comments, Greitemeyer, Mügge, & Bollermann, 2014) and well-liked by the receivers (only 3% were “not liked at all”; Forest & Wood, 2012). Therefore, they can be seen as equally positive but more valuable than likes (Schöndienst & Dang-Xuan, 2011).

### 1.2.3. Interpersonal appraisal of participants' status updates by Facebook friends

However, while the numbers of likes and unique commenters capture the amount of direct positive social feedback they might not be well-suited to assess less direct social responses. Friends might enjoy reading status updates and feel closer to the poster but might not decide to respond to them (Burke & Kraut, 2014). Similarly, likes and comments do not capture whether status updates annoy friends or alienate them because, in that case, friends would most likely just refrain from responding at all (Bryant & Marmo, 2012; Forest & Wood, 2012). Moreover, status updates could prime friends to respond to and interact with the poster using private communication channels on or beyond Facebook (e.g., Messenger, WhatsApp, text messaging) or turn to more traditional means of remote communication such as the phone (Ellison, Steinfield, & Lampe, 2011). Hence, another approach to measure social responses to status updates more broadly is to directly assess evaluations of posters' friends. Therefore, we developed a measure of friends' appraisal of the poster's status updates for the present research.

### 1.3. Valence, personality, and social responses to status updates

Valence is a fundamental dimension to describe status updates and has hence received considerable attention in research on status updates (Kramer, Guillory, & Hancock, 2014; Utz, 2015; Zhang, 2010). Moreover, research indicates that the valence of status updates is related to the social responses a status update elicits. There seems to exist a social norm of honest but positive self-presentation on Facebook (Bryant & Marmo, 2012). Accordingly, if status updates contained expressions of positive emotions they received more likes (Zhang, 2010) and friends indicated to feel closer to the poster after reading more positive status updates (Utz, 2015). However, more positive status updates received fewer comments (Zhang, 2010) just as more uplifting status updates in comparison to more depressing ones (Barash, Ducheneaut, Isaacs, & Bellotti, 2010). While more negative status updates get more elaborate direct feedback, i.e., more comments and fewer likes, especially the responses of weak ties might be unpleasant. More negativity in status updates was related to less liking of the poster by strangers (Forest & Wood, 2012) and more negativity in tweets predicted a loss of followers (Hutto, Yardi, & Gilbert, 2013).

Both extraversion and social anxiety are related to the expression of positivity and negativity. Individuals high in extraversion habitually experience more positive emotions than introverts (Larsen & Augustine, 2008). Unsurprisingly, they also use more positive words in their naturalistic speech (Augustine, Mehl, & Larsen, 2011) as well as in their status updates (Schwartz et al., 2013). In contrast, socially anxious individuals experience and express less positive and more negative affect (Brown et al., 2007; Kashdan, 2007; Kashdan & Breen, 2008; Turk, Heimberg, Luterek, Mennin, & Fresco, 2005) which will likely also be reflected in their status updates. Hence, in order to assess whether the valence of status updates drives or masks a potential effect of extraversion or social anxiety on social responses of status updates, we included

it in the present research.

Furthermore, following Forest and Wood's (2012) line of reasoning that Facebook friends particularly "reward" non-typical emotional expressions with direct social feedback, we also assessed whether extraversion respectively social anxiety moderates potential effects of valence on social responses to status updates. In their study on self-esteem and direct social feedback to status updates, Forest and Wood (2012) found that more negativity in status updates was associated with more social feedback for individuals high in self-esteem who are assumed to habitually express less negativity than individuals low in self-esteem. For positivity they found the reverse effect. More positive status updates by individuals high in self-esteem did not gain more social feedback but positivity by low self-esteem individuals was rewarded by their Facebook friends.

#### 1.4. Frequency of status updating

Even though this paper focusses on social responses to status updates, we also assessed whether extraversion and social anxiety are related to the extent to which somebody engages in status updating behavior based on the reasoning that posting status updates is a necessary precondition for eliciting social responses to status updates. So far, empirical evidence has been mixed. While some studies did not find a significant association between extraversion and self-reported (Ross et al., 2009; Winter et al., 2014) or objectively measured status updating activity (Ivcevic & Ambady, 2013), others found that extraversion positively predicted status updating (self-reported: Garcia & Sikström, 2014; Ong et al., 2011; objectively measured: Bachrach, Kosinski, Graepel, Kohli, & Stillwell, 2012). Similarly, one study found evidence for a negative relationship between social anxiety and objectively measured status updating activity (Weidman & Levinson, 2015), while another study did not find a significant relationship (Fernandez, Levinson, & Rodebaugh, 2012).

#### 1.5. Overview

In this paragraph, a short summary of the hypotheses and research questions of the study is presented.

Part 1 of the study assesses the relationship between personality and status updating activity. Based on existing empirical evidence summarized in paragraph 1.4., we hypothesize that extraversion positively predicts status updating activity (Hypothesis 1A) and that social anxiety negatively predicts status updating activity (Hypothesis 1B).

In part 2 of the study, we explore the role of personality in predicting direct social feedback to status updates based on two prominent hypotheses in research on online communication, the social enhancement and the social compensation hypothesis. More specifically, we assess whether more extraverted individuals -as suggested by the social enhancement hypothesis- or more introverted individuals -as suggested by the social compensation hypothesis- receive more direct social feedback to their status updates (Research question 1A) and whether individuals lower in social anxiety -as suggested by the social enhancement hypothesis- or higher in social anxiety -as suggested by the social compensation hypothesis- receive more direct social feedback to their status updates (Research question 1B).

Because valence is a fundamental dimension to describe status updates, part 3 of the study aims to explore the interplay between valence, personality, and direct social feedback to status updates. Based on existing empirical evidence, we hypothesize that more positive status updates receive more likes (Hypothesis 2A) while less positive status updates are commented on by more friends

(Hypothesis 2B). Moreover, as suggested by research on the relationship between personality and valence in other areas, we expect that status updates posted by individuals higher in extraversion are more positive (Hypothesis 3A) whereas status updates posted by individuals higher in social anxiety are less positive (Hypothesis 3B). Because valence of status updates is likely influenced by the personality of the poster and also has an effect on how much direct social feedback a status update receives, we assess whether valence drives or masks a potential effect of extraversion respectively social anxiety on the amount of direct social feedback a status update receives (Research question 2A/2B). Last but not least, following Forest and Wood's (2012) line of reasoning that Facebook friends particularly "reward" non-typical emotional expressions with direct social feedback, we also explore whether extraversion respectively social anxiety moderates potential effects of valence on direct social feedback to status updates (Research question 3A/3B).

Part 4 of the study again assesses whether social compensation or social enhancement effects emerge in the context of status updating. However, instead of exploring the effect of personality on direct social feedback as in part 2, we focus on the effects of personality on the interpersonal appraisal of participants' status updates by Facebook friends. More specifically, we assess whether the status updates of more extraverted individuals -as suggested by the social enhancement hypothesis- or the status updates of more introverted individuals -as suggested by the social compensation hypothesis- are appreciated more by their Facebook friends (Research question 4A) and whether the status updates of individuals lower in social anxiety -as suggested by the social enhancement hypothesis- or the status updates of individuals higher in social anxiety -as suggested by the social compensation hypothesis- are appreciated more by their Facebook friends (Research question 4B).

In order to test these hypotheses and address our research questions, we used data from two studies. Study 1 was conducted with a US American sample in spring 2011 and study 2 with a German sample in spring 2012. In both studies participants reported their extraversion and social anxiety, and their natural status updating activity as well as the number of likes and the number of individual commenters for each status update were recorded from their Facebook profile pages. Moreover, raters judged the status updates in respect to their valence. In study 2, Facebook friends of the participants also completed a measure of their appraisal of the participant's status updates.

## 2. Study 1

### 2.1. Participants

153 undergraduate students (93 female,  $M_{age} = 20.18$ ,  $SD_{age} = 3.24$ ) at the University of Arizona participated in the study for partial course credit. After participants had completed the personality questionnaires and we had accessed their Facebook profile to extract information about their status updating activity, participants took part in an intervention study (see große Deters & Mehl, 2013, for a description of the intervention study, and große Deters, Mehl, & Eid, 2014, for other, non-overlapping results based on this dataset).

### 2.2. Procedures and measures

The study was conducted completely online and questionnaires were administered using the web-based survey software DatStat Illume (DatStat, Inc., Seattle, WA). Participants completed a large set of questionnaires on personality and well-being. In the

following only measures relevant to the present research questions will be described. Because the measures used different scales what makes comparisons difficult, we applied a linear transformation to convert all scores to “percentage of maximum possible scores (POMP-Scores; Cohen, Cohen, Aiken, & West, 1999). Participants completed the Big Five Inventory (John & Srivastava, 1999) which assesses extraversion with eight items on a seven-point Likert-type scale (Cronbach's  $\alpha = .85$ ,  $M = 61.21$ ,  $SD = 18.27$ ). Participants also filled out the 6-item social anxiety subscale of the Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975). Participants indicated on a five-point Likert-type scale to what extent they agreed with statements such as “It takes me time to overcome my shyness in new situations.”, “I get embarrassed very easily.”, or “I feel anxious when I speak in front of a large group.” (Cronbach's  $\alpha = .80$ ,  $M = 47.17$ ,  $SD = 21.54$ ).

In addition to completing the questionnaires, participants were asked to add our “Research Profile” as a friend on Facebook. We accessed the wall (now referred to as timeline) of their profile which, among other things, shows previously posted status updates as well as comments and likes which these status updates have received. Please refer to große Deters et al. (2014) for a definition of status updates. Focusing on a time period of 59 days prior to study entry, we then (1) counted the number of status updates posted by the participant ( $Md = 11$ ,  $IQR = 3–27$ ,  $Min = 0$ ,  $Max = 116$ ), (2) recorded the number of likes each of those status updates had received ( $Md = 2$ ,  $IQR = 1–4$ ,  $Min = 0$ ,  $Max = 28$ ), (3) determined how many different friends had commented on each status update ( $Md = 1$ ,  $IQR = 0–2$ ,  $Min = 0$ ,  $Max = 17$ ), and (4) copied, pasted, and anonymized the text of the status updates for later ratings of their valence.

For the ratings of valence, two research assistants rated how much positivity respectively negativity was expressed in each status update on 5-point scales (1 = none at all, 5 = a great deal) Again we converted all scores to POMP-scores. 127 of the 3161 status updates could not be rated (e.g., due to containing foreign languages such as Arabic). The interrater reliability was  $ICC(2,2) = 0.86$  for positivity and  $ICC(2,2) = 0.87$  for negativity (Shrout & Fleiss, 1979). All valence ratings for each status update were averaged (positivity:  $M = 34.85$ ,  $SD = 29.52$ ; negativity:  $M = 15.79$ ,  $SD = 24.29$ ;  $r = -0.53$ ) and we then formed a measure of overall valence for each status update by subtracting negativity from positivity ( $M = 59.52$ ,  $SD = 23.63$ ; higher numbers indicate more positive status updates).<sup>1</sup>

### 3. Results study 1

#### 3.1. Part 1: personality and status updating activity

In a first step, we assessed whether extraversion and social anxiety predicted the number of posted status updates. Because our outcome – the number of status updates – was a count variable with a small mean (Coxe, West, & Aiken, 2009) we used Poisson regression models. Count variables can take on only nonnegative integer values as they reflect counts of events or objects. Hence, Poisson regression models should be used instead of ordinary least square regression (OLS) because count variables as outcomes often violate assumptions of OLS regression which may result in biased standard errors, biased tests of significance, and problems with statistical power (Gardner, Mulvey, & Shaw, 1995). We chose negative binomial models for our analyses instead of the standard Poisson model because their fit was significantly better. Negative binomial models allow for unexplained between-subjects

variability, while the standard Poisson model necessitates the strict assumption of equal conditional mean and variance (Coxe et al., 2009).

In two separate count regression analyses ( $N = 153$ ), neither extraversion nor social anxiety emerged as significant predictors of the number of status updates posted by participants ( $b_{extraversion} = 0.011$ ,  $SE = 0.007$ ,  $p = .10$ , 95% CI  $[-0.002, 0.024]$ ;  $b_{social\ anxiety} = -0.005$ ,  $SE = 0.005$ ,  $p = .35$ , 95% CI  $[-0.014, 0.005]$ ).

#### 3.2. Part 2: personality and direct social feedback

To assess whose status updates elicit more direct social feedback by Facebook friends, we applied Generalized Linear Mixed Models to account for the nested structure (status updates nested within participants) and the fact that our outcome variables (likes and commenters) were count variables (Aiken, Mistler, Coxe, & West, 2015). On level 2 of the models,  $n = 131$  participants with at least one status update were included in the analyses. On level 1 of the models, a total of 3161 status updates for analyses of likes and 3145 status updates for analyses of commenters were available (status updates per participant:  $Md = 15$ ,  $IQR = 5–30$ ,  $Min = 1$ ,  $Max = 116$ ). For all analyses we used the R package “glmmADMB” (Skaug, Fournier, Nielsen, Magnusson, & Bolker, 2013) which allows to compare the fit of different count regression models. Again, the Negative Binomial Models showed the best fit and we fitted Random-Intercept Models with Laplace approximation for parameter estimation (Bolker et al., 2009).

##### 3.2.1. Likes

Neither extraversion nor social anxiety significantly predicted the number of likes received per status update ( $estimate_{extraversion} = 0.003$ ,  $SE = 0.003$ ,  $z = 0.95$ ,  $p = .34$ , 95% CI  $[-0.003, 0.009]$ ;  $estimate_{social\ anxiety} = -0.005$ ,  $SE = 0.003$ ,  $z = -1.78$ ,  $p = .08$ , 95% CI  $[-0.010, 0.000]$ ).<sup>2</sup>

##### 3.2.2. Commenters

Again, both extraversion and social anxiety did not significantly predict the number of individual commenters per status update ( $estimate_{extraversion} = -0.001$ ,  $SE = 0.003$ ,  $z = -0.40$ ,  $p = .69$ , 95% CI  $[-0.006, 0.004]$ ;  $estimate_{social\ anxiety} = -0.002$ ,  $SE = 0.002$ ,  $z = -0.92$ ,  $p = .36$ , 95% CI  $[-0.007, 0.002]$ ).<sup>3</sup>

#### 3.3. Part 3: valence of status updates, personality, and direct social feedback

In the next step, we explored the role of valence of status updates. Specifically, we assessed (1) whether valence predicted how much direct social feedback a status update elicits, (2) how valence of status updates was related to personality, (3) whether valence influenced the relationship between personality and direct social feedback, and (4) whether interactions between personality and valence predicted direct social feedback.

##### 3.3.1. Valence and direct social feedback

To assess whether the valence of a status update predicts direct social feedback to that status update, we used Generalized Linear Mixed Models with valence as a predictor on level 1 of the model. Our analyses showed that status updates that are more positive in

<sup>2</sup> When controlling for the number of Facebook friends, which was significantly correlated with extraversion ( $r(130) = .42$ ,  $p = .00$ ) and social anxiety ( $r(130) = .35$ ,  $p = .00$ ), the effects for personality remained non-significant.

<sup>3</sup> Again, when controlling for the number of Facebook friends, the effects for personality remained non-significant.

<sup>1</sup> Separate analyses for positivity and negativity yielded comparable results.



comparison to other status updates of the same individual (group-mean centered valence) as well as more positive in comparison to all other status updates in our sample (grand-mean centered valence) received more likes ( $estimate_{group-mean} = 0.009$ ,  $SE = 0.001$ ,  $z = 7.96$ ,  $p < .000$ , 95% CI [0.007, 0.011];  $estimate_{grand-mean} = 0.009$ ,  $SE = 0.001$ ,  $z = 8.31$ ,  $p < .000$ , 95% CI [0.007, 0.011]).<sup>4</sup> However, more positive status updates were commented on by significantly fewer different commenters ( $estimate_{group-mean} = -0.005$ ,  $SE = 0.001$ ,  $z = -6.23$ ;  $p < .000$ , 95% CI [-0.007, -0.004];  $estimate_{grand-mean} = -0.005$ ,  $SE = 0.001$ ,  $z = -6.12$ ;  $p < .000$ , 95% CI [-0.007, -0.004]).

### 3.3.2. Valence and personality

Next, we assessed whether valence could be predicted by personality. Because valence is not a count variable but we still needed to account for the nested structure (status updates in participants), we applied Linear Mixed Models using the R package “lme4” (Bates, Maechler, Bolker, & Walker, 2013; estimator: Restricted Maximum Likelihood). Extraversion significantly predicted a more positive valence of status updates ( $estimate = 0.095$ ,  $SE = 0.043$ ,  $t(128) = 2.20$ ,  $p = .03$ , 95% CI [0.010, 0.180]). However, social anxiety did not emerge as a significant predictor of valence ( $estimate = -0.035$ ,  $SE = 0.037$ ;  $t(128) = -0.94$ ;  $p = .35$ , 95% CI [-0.108, 0.038]).

### 3.3.3. Controlling for valence

Next, we included (grand-mean centered) valence as a control variable in our analyses predicting direct social feedback with personality. Results (see Tables 1A and B) showed that after controlling for valence which was a significant predictor, both extraversion and social anxiety still did not significantly predict likes or commenters.

### 3.3.4. Personality as a moderator

Following Forest and Wood's (2012) line of reasoning, that non-typical emotional expressions might be rewarded more, we assessed whether interactions between personality and (group-mean centered) valence predicted social feedback. Indeed, for likes as an outcome, the interactions between valence and extraversion respectively social anxiety emerged as significant predictors (see Tables 2A and B). For probing the interactions we plotted the conditional effect of valence at different levels of the moderator, i.e., extraversion respectively social anxiety using the javascript program provided by Preacher, Curran, and Bauer (2003) (Fig. 1). Please note that – as recommended by Cox et al. (2009) – the outcome is displayed as the logarithm of likes and not in its original metric. Presented in this way, the interpretation of the interactions is the

**Table 1A**

Generalized linear mixed models predicting likes with personality while controlling for grand mean-centered valence (US sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.810	0.205	3.96	<.000	0.409 1.211
Extraversion	0.002	0.003	0.72	.47	-0.004 0.008
Valence	0.009	0.001	8.31	<.000	0.007 0.011
$\sigma^2_{intercept}$	0.298				
$\sigma^2_{valence}$	0.000				
(Intercept)	1.171	0.132	8.89	<.000	0.913 1.429
Social Anxiety	-0.005	0.003	-1.84	.07	-0.010 0.000
Valence	0.009	0.001	8.33	<.000	0.007 0.011
$\sigma^2_{intercept}$	0.289				
$\sigma^2_{valence}$	0.000				

<sup>4</sup> Due to a better fit of those models, we included a random slope.

**Table 1B**

Generalized linear mixed models predicting commenters with personality while controlling for grand mean-centered valence (US sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.303	0.187	1.62	.11	-0.063 0.670
Extraversion	-0.001	0.003	-0.20	.84	-0.006 0.005
Valence	-0.005	0.001	-6.11	<.000	-0.007 -0.004
$\sigma^2_{intercept}$	0.220				
(Intercept)	0.368	0.121	3.04	.00	0.131 0.605
Social Anxiety	-0.002	0.002	-0.91	.36	-0.007 0.002
Valence	-0.005	0.001	-6.13	<.000	-0.007 -0.004
$\sigma^2_{intercept}$	0.218				

**Table 2A**

Generalized linear mixed models predicting likes with (centered) personality, (group-mean centered) valence, and the interaction of personality and valence (US sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.948	0.059	16.17	<.000	0.833 1.063
Extraversion	0.003	0.003	1.03	.30	-0.003 0.010
Valence	0.009	0.001	8.50	<.000	0.007 0.011
Valence × Extraversion	0.000	0.000	-2.37	.02	0.000 0.000
$\sigma^2_{intercept}$	0.338				
$\sigma^2_{valence}$	0.000				
(Intercept)	0.948	0.058	16.36	<.000	0.834 1.062
Social Anxiety	-0.005	0.003	-1.84	.07	-0.010 0.000
Valence	0.009	0.001	8.63	<.000	0.007 0.011
Valence × Social-Anxiety	0.000	0.000	2.78	.01	0.000 0.000
$\sigma^2_{intercept}$	0.329				
$\sigma^2_{valence}$	0.000				

same as for Ordinary Least Square Regression. More positive status updates elicited more likes but this effect was more pronounced for individuals with low extraversion or high social anxiety. In contrast, in our analyses for the number of commenters as an outcome, no interaction emerged as a significant predictor but valence remained a significant negative predictor.

## 4. Study 2

### 4.1. Participants

The study was advertised via mailing lists of student organizations from universities all over Germany as a “Psychological Study about Facebook Use” and a compensation of 20€ was offered (see große Deters et al., 2014 for other, non-overlapping results from this dataset). Of the 270 participants we excluded 57 s because they did not complete all relevant self-report measures and four participants because they did not grant us access to their Facebook profile by adding our “Research Profile” as a friend. The final sample consisted of  $N = 209^5$  participants (185 female;  $M_{age} = 23.50$ ,  $SD_{age} = 3.54$ ).

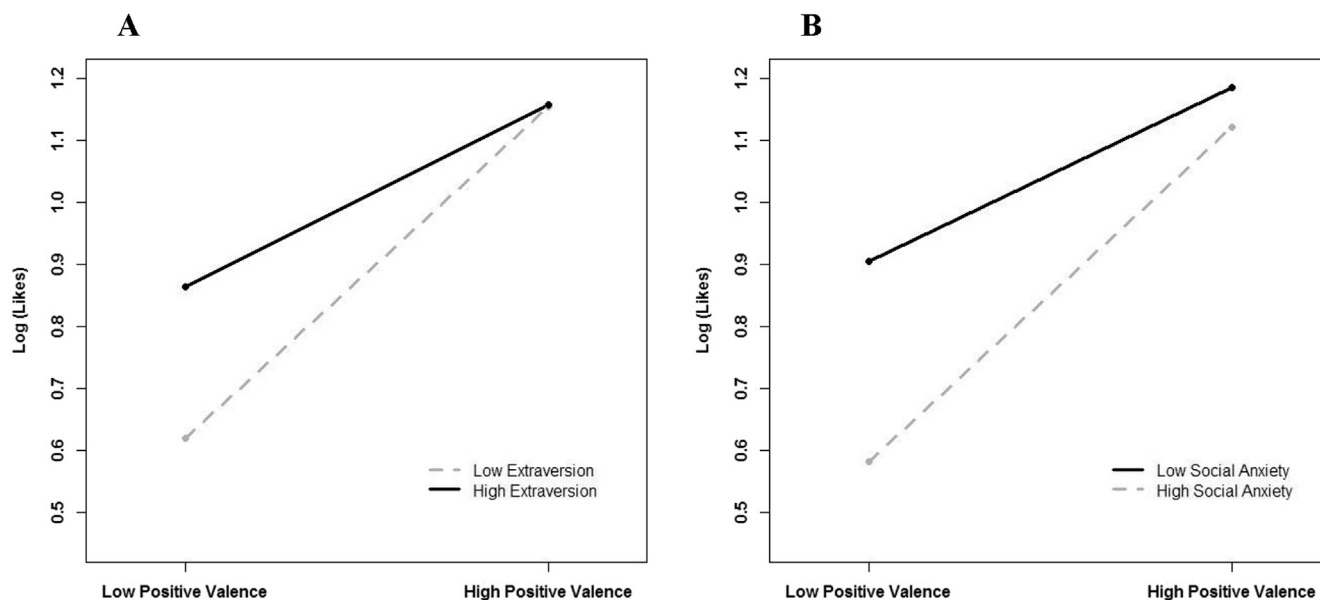
The study consisted of two main parts: Firstly, the collection of self-report measures and extraction of information directly from participants' Facebook profiles and secondly, an experimental intervention (see große Deters & Mehl, 2013 for a similar intervention) to assess the effects of an increase in status updating over

<sup>5</sup> Please note that only 207 of the participants reported on in this paper are identical to the sample in the paper of große Deters et al. (2014) because two participants who completed the self-report measures relevant for this paper failed to complete the narcissism questionnaire which constituted the basis for the analyses of große Deters et al. (2014), whereas two participants included in the other paper failed to complete the self-report measures relevant for the present analyses and thus were excluded.

**Table 2B**

Generalized linear mixed models predicting commenters with (centered) personality, (group-mean centered) valence, and the interaction of personality and valence (US sample).

	Estimate	SE	z value	p value	CI 95%	
(Intercept)	0.272	0.051	5.38	<.000	0.173	0.371
Extraversion	–0.001	0.003	–0.37	.71	–0.007	0.004
Valence	–0.005	0.001	–6.12	<.000	–0.007	–0.004
Valence $\times$ Extraversion	0.000	0.000	–0.16	.88	0.000	0.000
$\sigma^2_{\text{intercept}}$	0.217					
(Intercept)	0.269	0.050	5.34	<.000	0.170	0.367
Social Anxiety	–0.002	0.002	–0.84	.40	–0.007	0.003
Valence	–0.005	0.001	–6.17	<.000	–0.007	–0.004
Valence $\times$ Social-Anxiety	0.000	0.000	0.18	.86	0.000	0.000
$\sigma^2_{\text{intercept}}$	0.215					



**Fig. 1.** Simple slopes of valence predicting the logarithm of likes for (A) low and high extraversion and (B) low and high social anxiety. For valence, extraversion, and social anxiety, low refers to the value one standard deviation below the mean, and high refers to the value one standard deviation above the mean.

the course of one week on participants' loneliness which is not relevant to the research questions of the present paper. However, the interpersonal appraisal of participants' status updates by Facebook friends was collected after this intervention. Hence, for these analyses, we only included participants with at least one informant report<sup>6</sup> who had been randomly assigned to one of the two control conditions ( $n = 91$ ) and excluded all experimental participants. In control condition 1, participants only received feedback on how many status updates they usually post per week. In control condition 2, participants were additionally asked to post more status updates than usually but to restrict the audience of these status updates to our "Research Profile" by changing their privacy settings for status updates accordingly. Hence, Facebook friends did not see any changes in status updating behavior because they could not see the additional updates (which we were able to check) and therefore, no influence of the experimental manipulation on the interpersonal appraisal ratings by Facebook friends of the control participants can be expected.

#### 4.2. Procedures and measures

The study was conducted completely online and questionnaires were administered using the web-based survey software SoSci Survey (Leiner, 2014). Participants completed a large set of questionnaires on personality, well-being, and Facebook use. In the following, only measures relevant to the present research questions will be described. Again, all scores were converted to POMP-scores. Participants filled out the German short version (Rammstedt & John, 2005) of the Big Five Inventory (John & Srivastava, 1999). Extraversion was assessed with four items on a five-point Likert-type scale (Cronbach's  $\alpha = .82$ ;  $M = 65.16$ ,  $SD = 21.43$ ). For the assessment of social anxiety, participants completed the 12-item social anxiety subscale of the German version (Merz, 1986) of the Self-Consciousness Scale (Fenigstein et al., 1975; Cronbach's  $\alpha = .89$ ,  $M = 41.95$ ,  $SD = 18.15$ ).

As in study 1, participants were asked to add our "Research Profile" as a friend on Facebook and we then accessed the wall of their profile to extract information for a time period of six weeks prior to study entry (17 days less than in study 1). Specifically, we (1) counted the number of status updates posted by the participant during those six weeks ( $Md = 1$ ,  $IQR = 0-4$ ,  $Min = 0$ ,  $Max = 27$ ), (2) recorded the number of likes each of those status updates had received ( $Md = 2$ ,  $IQR = 1-4$ ,  $Min = 0$ ,  $Max = 34$ ), (3) determined

<sup>6</sup> There was no significant difference in extraversion or social anxiety between control participants with at least one informant report ( $n = 91$ ) and control participants who were excluded from the analyses ( $n = 47$ ).

how many different friends had commented on each status update ( $Md = 1$ ,  $IQR = 0-2$ ,  $Min = 0$ ,  $Max = 17$ ), and (4) copied, pasted, and anonymized the text of the status updates for later ratings of their valence.

For the ratings of valence, four research assistants rated how much positivity respectively negativity was expressed in each status update on 9-point scales (1 = none at all, 9 = a great deal). Again, we converted scores to POMP-scores. Unfortunately, due to a loss of data, the ratings of two of the raters for 201 of 655 status updates could not be used in the present research. The interrater reliability based on the status updates that were rated by all four raters was  $ICC(2,4) = 0.90$  for positivity as well as for negativity (Shrout & Fleiss, 1979). All valence ratings for each status update were averaged (positivity:  $M = 26.63$ ,  $SD = 19.90$ ; negativity:  $M = 9.27$ ,  $SD = 14.44$ ;  $r = -0.58$ ) and we then formed a measure of overall valence for each status update by subtracting negativity from positivity ( $M = 58.68$ ,  $SD = 15.30$ ; higher numbers indicate more positive status updates).<sup>7</sup>

To assess the interpersonal appraisal of participants' status updates by Facebook friends, we followed the procedure to collect informant reports proposed by Vazire (2006). Firstly, participants were asked to provide up to six e-mail addresses of friends or family. Then, friends and family members were invited via email to complete an online questionnaire about the participant, including a newly developed 6-item measure of their appraisal of the participant's status updates. The stem "If (name of the participant) posts a status update ..." was followed by the items "... I find that annoying (reverse coded)"; "... I get motivated to contact him/her (to call, write a private message etc.)"; "... I think he/she just wants to brag" (reverse coded); "... I like to read them."; "... I get the feeling that I am taking part in his/her life."; and "... I wonder, who finds what he/she posts interesting at all.". All close ties who had previously indicated that they are Facebook friends with the participant and that they had at least once read a status update by the participant, rated those items in their German translation (see Appendix for the original items) on a 5-point Likert-type scale. We again converted the scores to POMP-scores (for ratings aggregated over all informants of each participant: Cronbach's  $\alpha = .78$ ,  $M = 74.98$ ,  $SD = 15.98$ ). Most participants (53%) had one informant report, whereas 34% had two and 13% had three informant reports. In total, 146 informant reports (93 female, 50 male, 3 not stated;  $M_{age} = 29.46$ ,  $SD_{age} = 11.62$ .) were collected. Most informants indicated to be friends (65%), boyfriend or girlfriend (14%), or family (18%) of the participant they rated.

## 5. Results study 2

### 5.1. Part 1: personality and status updating activity

As in study 1, we ran two separate count regression analyses ( $N = 209$ ) and neither extraversion nor social anxiety emerged as significant predictors of the number of status updates posted by participants ( $b_{extraversion} = 0.009$ ,  $SE = 0.007$ ,  $p = .20$ , 95% CI  $[-0.005, 0.024]$ ;  $b_{social\ anxiety} = -0.010$ ,  $SE = 0.006$ ,  $p = .08$ , 95% CI  $[-0.022, 0.001]$ ).

### 5.2. Part 2: personality and direct social feedback

To assess whose status updates elicit more direct social feedback by Facebook friends, we used the same analyses as in study 1 (Generalized Linear Mixed Models, distribution of the outcome: negative binomial). On level 2 of the models, all participants with at

least one status update for whom we were able to record the number of likes ( $n = 116$ ) and the number of different commenters ( $n = 114$ ) for each status update were included in the analyses. On level 1 of the models, a total of 655 status updates for analyses of likes and 647 status updates for analyses of commenters were available (status updates per participant:  $Md = 4$ ,  $IQR = 2-8$ ,  $Min = 1$ ,  $Max = 27$ ).

#### 5.2.1. Likes

For likes as an outcome, just as in study 1, neither extraversion nor social anxiety significantly predicted the number of likes received per status update ( $estimate_{extraversion} = 0.006$ ,  $SE = 0.003$ ,  $z = 1.91$ ,  $p = .06$ , 95% CI  $[-0.000, 0.012]$ ;  $estimate_{social\ anxiety} = -0.003$ ,  $SE = 0.000$ ,  $z = -0.89$ ,  $p = .37$ , 95% CI  $[-0.011, 0.004]$ ).<sup>8</sup>

#### 5.2.2. Commenters

Again, both extraversion as well as social anxiety did not significantly predict the number of individual commenters ( $estimate_{extraversion} = 0.002$ ,  $SE = 0.003$ ,  $z = 0.62$ ,  $p = .53$ , 95% CI  $[-0.004, 0.008]$ ;  $estimate_{social\ anxiety} = -0.001$ ,  $SE = 0.003$ ,  $z = -0.26$ ,  $p = .79$ , 95% CI  $[-0.008, 0.006]$ ).<sup>9</sup>

### 5.3. Part 3: status updates' valence, personality, and direct social feedback

As in study 1, we explored the role of the valence of status updates. Again we assessed (1) whether valence predicted direct social feedback, (2) the association between valence of status updates and personality, (3) whether valence influenced the relationship between personality and direct social feedback, and (4) whether interactions between personality and valence predicts direct social feedback.

#### 5.3.1. Valence and direct social feedback

Just as in study 1, status updates that are more positive in comparison to other status updates of the same individual (group-mean centered valence) as well as more positive in comparison to all other status updates (grand-mean centered valence) received more likes ( $estimate_{group-mean} = 0.026$ ,  $SE = 0.004$ ,  $z = 6.66$ ,  $p < .000$ , 95% CI  $[0.018, 0.033]$ ;  $estimate_{grand-mean} = 0.027$ ,  $SE = 0.004$ ,  $z = 7.58$ ,  $p < .000$ , 95% CI  $[0.020, 0.034]$ ).<sup>10</sup> However in contrast to study 1, valence did not emerge as a significant predictor of number of different commenters ( $estimate_{group-mean} = -0.003$ ,  $SE = 0.003$ ,  $z = -0.88$ ,  $p = .38$ , 95% CI  $[-0.009, 0.004]$ ;  $estimate_{grand-mean} = -0.002$ ,  $SE = 0.003$ ;  $z = -0.73$ ;  $p = .47$ , 95% CI  $[-0.008, 0.004]$ ).

#### 5.3.2. Valence and personality

In order to test, whether personality predicted the valence of status updates, we applied Linear Mixed Models with valence as the outcome. As in study 1, extraversion significantly predicted more positive valence ( $estimate = 0.089$ ,  $SE = 0.039$ ,  $t(114) = 2.30$ ,  $p = .02$ , 95% CI  $[0.013, 0.165]$ ) and social anxiety did not emerge as a significant predictor ( $estimate = -0.044$ ,  $SE = 0.048$ ;  $t(114) = -0.92$ ,  $p = .36$ , 95% CI  $[-0.139, 0.051]$ ).

<sup>8</sup> When controlling for the number of Facebook friends, which was significantly correlated with extraversion ( $r(116) = .36$ ,  $p = .00$ ) but not with social anxiety ( $r(116) = -0.17$ ,  $p = .06$ ), the effects for personality remained non-significant.

<sup>9</sup> Again, when controlling for the number of Facebook friends, the effects for personality remained non-significant.

<sup>10</sup> Due to a better fit of those models, we included a random slope.

<sup>7</sup> Separate analyses for positivity and negativity yielded comparable results.

### 5.3.3. Controlling for valence

Next, we included (grand-mean centered) valence as a control variable in our analyses predicting direct social feedback with personality. Just as in Study 1, results (see Table 3) showed that after controlling for valence which was a significant predictor, both extraversion and social anxiety still did not significantly predict likes. However, for commenters, neither personality nor valence were significant predictors (see Table 3B).

### 5.3.4. Personality as a moderator

Next, we assessed whether non-typical emotional expressions were rewarded more by friends. Hence, we tested whether interactions between mean-centered personality and group-mean centered valence predicted social feedback. In contrast to study 1, no significant interaction effects emerged for likes and, just as in study 1, the interaction effects for commenters were non-significant (see Tables 4A and B).

### 5.4. Part 4: interpersonal appraisal of participants' status updates by Facebook friends

Next, we assessed the role of personality in predicting broader social consequences of status updating as captured by our interpersonal appraisal measure. Because the interpersonal appraisal ratings made by Facebook friends were nested in participants, we again applied Linear Mixed Models using the R package “lme4” (Bates et al., 2013). On level 2 of the models, all control participants who had at least one rating of interpersonal appraisal were included ( $n = 91$ ). On level 1, 146 ratings were available ( $Md = 1$ ,  $IQR = 1-2$ ,  $Min = 1$ ,  $Max = 3$ ). Results showed that extraversion ( $estimate = -0.068$ ,  $SE = 0.078$ ,  $t(89) = -0.88$ ,  $p = .38$ , 95% CI  $[-0.220, 0.085]$ ) did not significantly predict interpersonal appraisal of status updates as measured by our questionnaire. However, social anxiety significantly predicted a more positive appraisal of participants' status updates by their Facebook friends ( $estimate = 0.223$ ,  $SE = 0.080$ ,  $t(89) = 2.80$ ,  $p < .01$ , 95% CI  $[0.066, 0.378]$ ).

### 5.4.1. Interpersonal appraisal and direct feedback and valence of status updates

In a last step, we explored the relationship between our interpersonal appraisal measure and the number of likes respectively commenters as well as the valence of status updates. Only for  $n = 47$  participants both appraisal ratings were available and they had posted at least one status updates in the six weeks before they entered the study. Hence, due to this small sample size the results of the following analyses need to be interpreted with caution. We calculated the average number of likes respectively commenters per status updates and averaged the valence ratings of all status updates per participant. Neither the average number of likes per

**Table 3A**

Generalized linear mixed models predicting likes with personality while controlling for grand mean-centered valence (German sample).

Likes	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.670	0.226	2.97	.00	0.228 1.113
Extraversion	0.004	0.003	1.24	.22	-0.002 0.010
Valence	0.027	0.004	7.53	<.000	0.020 0.034
$\sigma^2_{intercept}$	0.215				
$\sigma^2_{valence}$	0.000				
(Intercept)	1.033	0.162	6.40	<.000	0.717 1.350
Social Anxiety	-0.002	0.004	-0.65	.51	-0.010 0.005
Valence	0.027	0.004	7.56	<.000	0.020 0.034
$\sigma^2_{intercept}$	0.219				
$\sigma^2_{valence}$	0.000				

**Table 3B**

Generalized linear mixed models predicting commenters with personality while controlling for grand mean-centered valence (German sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.216	0.215	1.00	.32	-0.206 0.638
Extraversion	0.002	0.003	0.65	.52	-0.004 0.008
Valence	-0.002	0.003	-0.79	.43	-0.008 0.004
$\sigma^2_{intercept}$	0.128				
(Intercept)	0.216	0.215	1.00	.32	-0.206 0.638
Social Anxiety	0.002	0.003	0.65	.52	-0.004 0.008
Valence	-0.002	0.003	-0.79	.43	-0.008 0.004
$\sigma^2_{intercept}$	0.128				

**Table 4A**

Generalized linear mixed models predicting likes with (centered) personality, (group-mean centered) valence, and the interaction of personality and valence (German sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.958	0.068	14.02	<.000	0.824 1.092
Extraversion	0.005	0.003	1.60	.11	-0.001 0.012
Valence	0.025	0.004	6.58	<.000	0.018 0.033
Valence $\times$ Extraversion	0.000	0.000	0.96	.33	0.000 0.001
$\sigma^2_{intercept}$	0.278				
$\sigma^2_{valence}$	0.000				
(Intercept)	0.962	0.069	13.89	<.000	0.826 1.098
Social anxiety	-0.003	0.004	-0.78	.44	-0.011 0.005
Valence	0.026	0.004	6.59	<.000	0.018 0.033
Valence $\times$ Social-anxiety	0.000	0.000	-0.33	.74	0.000 0.000
$\sigma^2_{intercept}$	0.290				
$\sigma^2_{valence}$	0.000				

**Table 4B**

Generalized linear mixed models predicting commenters with (centered) personality, (group-mean centered) valence, and the interaction of personality and valence (German sample).

	Estimate	SE	z value	p value	CI 95%
(Intercept)	0.346	0.060	5.73	<.000	0.228 0.465
Extraversion	0.002	0.003	0.56	.57	-0.004 0.007
Valence	-0.003	0.003	-0.99	.32	-0.010 0.003
Valence $\times$ Extraversion	0.000	0.000	-0.26	.79	0.000 0.000
$\sigma^2_{intercept}$	0.127				
(Intercept)	0.347	0.061	5.72	<.000	0.228 0.466
Social anxiety	-0.001	0.004	-0.27	.79	-0.008 0.006
Valence	-0.003	0.003	-0.99	.32	-0.010 0.003
Valence $\times$ Social-anxiety	0.000	0.000	-0.06	.96	0.000 0.000
$\sigma^2_{intercept}$	0.129				

status updates nor the average number of commenters per status update significantly predicted the interpersonal appraisal ratings ( $estimate_{likes} = 1.262$ ,  $SE = 1.057$ ,  $t(45) = 1.19$ ,  $p = .24$ , 95% CI  $[-0.841, 3.350]$ ;  $estimate_{commenters} = 5.191$ ,  $SE = 3.007$ ,  $t(44) = 1.73$ ,  $p = .09$ , 95% CI  $[-0.699, 11.09]$ ). The average valence of status updates also did not significantly predict interpersonal appraisal ( $estimate = 0.405$ ,  $SE = 0.238$ ,  $t(45) = 1.70$ ,  $p = .10$ , 95% CI  $[0.045, 0.892]$ ).

## 6. Discussion

Table 5 provides an overview of all hypotheses and research questions along with the respective findings which will be discussed in the following.

### 6.1. Personality and status updating activity

Even though this paper's main focus is on social responses to status updates, in part 1, we tested the relationship between



**Table 5**

Overview hypotheses, research questions, and findings.

	US sample	German sample
<b>Part 1: Personality and status updating activity</b>		
H 1A: Extraversion positively predicts status updating activity.	–	–
H 1B: Social anxiety negatively predicts status updating activity.	–	–
<b>Part 2: Personality and direct social feedback</b>		
RQ 1A: Do more extroverted or more introverted individuals receive more direct social feedback to their status updates?	–	–
RQ 1B: Do individuals lower in social anxiety or higher in social anxiety receive more direct social feedback to their status updates?	–	–
<b>Part 3: Valence of status updates, personality, and direct social feedback</b>		
H 2A: More positive status updates receive more likes.	✓	✓
H 2B: More positive status updates are commented on by fewer friends.	✓	–
H 3A: Status updates posted by individuals higher in extraversion are more positive.	✓	✓
H 3B: Status updates posted by individuals higher in social anxiety are less positive.	–	–
RQ 2A: Does valence drive or mask an effect of extraversion on the amount of direct social feedback a status update receives?	–	–
RQ 2B: Does valence drive or mask an effect of social anxiety on the amount of direct social feedback a status update receives?	–	–
RQ 3A: Does extraversion moderate potential effects of valence on direct social feedback to status updates?	yes, on likes	–
RQ 3B: Does social anxiety moderate potential effects of valence on direct social feedback to status updates?	yes, on likes	–
<b>Part 4: Interpersonal appraisal of participants' status updates by Facebook friends</b>		
RQ 4A: Are the status updates of more extroverted individuals or the status updates of more introverted individuals appreciated more by their Facebook friends?		–
RQ 4B: Are the status updates of individuals lower in social anxiety or the status updates of individuals higher in social anxiety appreciated more by their Facebook friends?		those of individuals lower in social anxiety

personality and posting status updates. In both samples our analyses yielded no significant results for either extraversion or social anxiety but the effects were in the hypothesized direction. In an exceptional study, [Bachrach et al. \(2012\)](#) succeeded to objectively measure the status updating activity of 180,000 participants and to collect self-reports of their extraversion. Based on such a large sample, the reported correlation of  $r = 0.12$  is probably a very good estimate of the true effect size. This small effect size indicates that the failure to find a significant effect for extraversion in our study is likely due to a lack of power. However, while higher power would have been desirable, our study nevertheless contributes much needed high-quality data to the existing body of literature. Firstly, empirical evidence for social anxiety is with just two studies so far scarce. And secondly, just as [Bachrach et al. \(2012\)](#), we were able to measure status updating activity objectively. This is crucial because self-reports of status updating activity are potentially biased and have been shown to correlate only moderately with actual behavior ([Hampton, Goulet, Marlow, & Rainie, 2012](#)). And more importantly, if both personality and status updating activity are measured with self-reports, shared method variance can inflate their relationship ([Back & Egloff, 2009](#); [Podsakoff, MacKenzie, Lee, & Podsakoff, 2003](#)). Hence, the present results are an important contribution to the existing literature and once included in meta-analyses should help to draw valid conclusions in the future.

## 6.2. Personality and social responses

### 6.2.1. Personality and direct social feedback

To identify potential social enhancement or social compensation effects, we tested whether extraversion respectively social anxiety predicted how much direct feedback participants received to their status updates. Again, in both samples no significant effect emerged. This result is in line with a finding by [Marshall, Lefringhausen, and Ferenczi \(2015\)](#) who showed that extraversion was not significantly associated with the self-reported number of likes and comments participants indicated to receive on average per status update. As clearly evident, the empirical evidence is still scarce and two studies – even though they yielded similar results – do not allow to draw strong conclusions. However, it is conceivable

that main effects might not adequately describe the relationship between personality and direct social feedback to status updates. Personality likely influences various factors which might impact the amount of direct social feedback, like style and content of status updates (e.g., [Winter et al., 2014](#); [Schwartz et al. 2013](#)) or the composition of the audience (e.g., differences in the diversity of their social network; [Golbeck, Robles, & Turner, 2011](#)). But effects of personality on direct social feedback mediated through these factors might not emerge all in the same direction. For instance, extraverts might overshare mundane information about their current activity (e.g., “chillin with my bestie”; see [Schwartz et al. 2013](#)) and unsurprisingly, boring status updates are associated with fewer comments ([Barash et al., 2010](#)). At the same time, friends of extraverts tend to be more extraverted themselves ([Feiler & Kleinbaum, 2015](#)) and therefore, are generally more inclined to comment on status updates ([Ryan & Xenos, 2011](#)). Hence, such different effects potentially cancel each other out, resulting in an overall association between personality and direct social feedback that is not substantial.

### 6.2.2. Status updates' valence, personality, and direct social feedback

In line with this reasoning, in part 3 of our paper, we explored the role of valence, one important factor which could be expected to be associated with both personality and direct social feedback. Indeed, consistent with the results by [Zhang \(2010\)](#) in both samples a more positive valence predicted more likes. However, the inverse relationship for the number of different commenters only emerged in the US sample. Also in line with previous research, more extraverted individuals tended to post more positive status updates ([Schwartz et al., 2013](#)) but we did not find evidence for the hypothesized negative association between social anxiety and more positive valence of posts. Controlling for valence did not reveal masked effects of personality on direct social feedback. However, because valence was related to both direct feedback and extraversion, it is clearly a predictor that could prove useful in future studies assessing the influence of personality on social responses to status updates.

Furthermore, our analyses – even though only in the US sample

– revealed that both extraversion and social anxiety significantly moderated the positive effect of valence on likes. More positive status updates elicited more likes but this effect was more pronounced for individuals with low extraversion or high social anxiety. As shown in the present paper, individuals low in extraversion express less positivity in status updates. Moreover, the literature suggests that both individuals low in extraversion as well as high in social anxiety experience and express less positivity in general (e.g., Augustine et al., 2011; Brown et al., 2007; Kashdan, 2007; Larsen & Augustine, 2008; Turk et al. 2005). Hence, the results of the moderation analyses are in line with the interpretation that Facebook friends are particularly inclined to encourage non-typical emotional expressions by providing more direct social feedback as Forest and Wood (2012) argued explaining a similar effect for self-esteem on an aggregate of likes and commenters in a Canadian sample. Even though these explorative findings need to be backed up by further research, they suggest that it is worthwhile to explore potential moderation effects of personality in order to fully understand how personality influences social responses to status updates. Moreover, they highlight that Facebook friends might judge status updates in the context of their previous experiences with the poster. This might particularly be the case because status updates are generally short, often provide no context, and remain ambiguous without additional background information (Kramer & Chung, 2011; Strässle, 2015). Facebook is an online environment mostly built around users' real-life identities (Utz, 2015) and it is primarily used to connect with already existing offline ties (Ellison et al., 2011). Hence, for many friends these previous experiences and contextual information will be dominated by the offline behavior of the poster which might be largely determined by his or her personality (e.g., Asendorpf & Wilpers, 1998; Paunonen, 2003). Therefore, personality might not only directly influence the content of status updates but also how status updates with different types of content are evaluated by Facebook friends. A misanthropic status update by a usually cheerful and sociable poster probably is interpreted differently by friends than the very same status update posted by a loner (Forest, Kille, Wood, & Holmes, 2014). This additional pathway through which personality might influence social responses to status updates certainly deserves additional attention.

### 6.2.3. Interpersonal appraisal and direct feedback and valence of status updates

In order to capture social responses to status updates more broadly, friends' appraisal of the poster's status updates were assessed directly in the German sample. No significant effect for extraversion emerged. However, in line with the social compensation hypothesis, the status updates of individuals higher in social anxiety received better appraisal ratings than those of individuals lower in social anxiety. High social anxiety is related to problems in social interactions offline (Schlenker & Leary, 1982) but the opposite might be true for communication via status updates. Notably, as previously reported, we did not find any evidence that the status updates of socially anxious individuals also elicit more direct social feedback. However, there are several important differences between these two measures of social responses to status updates. Firstly, the interpersonal appraisal ratings captured the evaluations of strong ties and not those of a selected sample of all Facebook friends of the participants. Almost all individuals who completed the interpersonal appraisal measure were friends who reported to know the participant on average for more than four years, or family members respectively partners. In contrast, for direct social feedback we could not distinguish between feedback of strong and weak ties. Hence, it is possible that strong ties also express their appraisal for the status updates of socially anxious individuals by

liking and commenting more. However, if social anxiety does not or negatively predict the direct social feedback of weak ties – who are in the majority on Facebook (Manago, Taylor, & Greenfield, 2012) – this association would be hidden. Secondly, in comparison to the number of likes and unique commenters, the interpersonal appraisal ratings measured social consequences of status updates more broadly. For instance, it also captured negative social responses to status updates like feelings of annoyance. Such negative feelings and subsequent unfavorable judgements of the posters are common (Lapides, Chokshi, Carpendale, & Greenberg, 2015). Because socially anxious individuals are afraid to leave a bad impression on others (Schlenker & Leary, 1982), they might take more time to carefully craft their status updates and avoid content that potentially annoys their audience (Shaw, Timpano, Tran, & Joormann, 2015). Consistent with this idea, based on their Facebook profile pages individuals high in social anxiety were judged as more likable by strangers than individuals low in social anxiety (Fernandez et al., 2012).

Furthermore, the interpersonal appraisal rating also measured whether status updates fostered feelings of closeness and prompted friends to initiate social interaction – other than direct public responses to the status update – with the poster. Because socially anxious individuals typically self-disclose less in face-to-face interactions (Cuming & Rapee, 2010; Meleshko & Alden, 1993; Reno & Kenny, 1992; Schlenker & Leary, 1982; Sparrevohn & Rapee, 2009) than non-socially anxious individuals, their status updates likely broadcast more information yet unknown even to their close ties. Hence, these status updates likely promote feelings of closeness and motivate friends to follow-up on the news. Moreover, because socially anxious individuals tend to avoid social situations and do not draw attention to themselves (Baker & Oswald, 2010; Schlenker & Leary, 1982), friends might more easily lose sight of them. Therefore, more often than in case of non-socially anxious individuals a status update might be the much needed reminder for friends to do that long intended phone call or finally respond to an old email. Taken together, there are good reasons to believe that social anxiety predicts more pleasant social responses to status updates – at least if the focus is on less direct responses by close ties.

## 7. Limitations and directions for future research

A limitation of the present research, as noted before, is that it only assessed the overall amount of direct feedback but did not capture *who* liked and commented on status updates. A more fine-grained analysis differentiating for instance between likes and comments by strong versus weak ties of the posters might help to reveal effects of extraversion or social anxiety otherwise hidden. However, participants might not be very committed to the tedious and time-consuming task of categorizing each Facebook friend who liked or commented on one of their status updates. Hence, such analyses might only be possible with small samples of participants and status updates. Likewise but easier to implement, it would be a good extension of the present research to investigate broader social responses to status updates as measured with our interpersonal appraisal rating of weak and not only of strong ties. Negative reactions to status updates appear to be particularly prevalent for status updates of distant acquaintances (Lapides et al., 2015) and hence, they should be assessed also within weak ties. Moreover, future research should continue to explore the complex interplay between personality, qualities of the status updates, and the audience on social responses to status updates. Importantly, while valence of status updates could be easily and reliably judged by independent raters, this is not necessarily the case for other potentially interesting aspect of status updates like humor or

reassurance seeking (Forest & Wood, 2012; Utz, 2015). In comparison to independent raters, even distant acquaintances of the poster can rely on more contextual knowledge to interpret a status update. Hence, future research should collect ratings of, e.g., humor by members of the actual audience of the status update as has been successfully done in studies assessing impression management (Barash et al., 2010) or effects of status updates on feelings of connection (Utz, 2015). Another limitation of the present research is that all participants attended college. Considering the fact that young and old Facebook users have been shown to differ in respect to the content of their status updates (Schwartz et al., 2013), it is conceivable that different associations between extraversion or social anxiety and social responses to status updates might emerge in other age groups which should be assessed empirically.

Last but not least, even though the data collection is more complicated and time-consuming than relying exclusively on self-reports, future research should continue to use observational measures and informant-reports to capture social responses to status updates. Because it is desirable to receive many and positive social responses to one's status updates, self-reports of social responses likely also reflect to an unknown degree individual differences in tendencies for self-enhancement (Podsakoff et al., 2003). And informant-reports on social responses are particularly valuable because they provide information which is – at least partially – not accessible to participants (Vazire, 2006). Moreover, employing different measures avoids the risk of inflated effects due to shared method variance (Back & Egloff, 2009; Podsakoff et al., 2003). Particularly for studying associations between social anxiety and social responses, self-reports are problematic because empirical evidence suggests that socially anxious individuals have a biased perception and systematically underestimate positive reactions of others to their social performances (Clark & Arkowitz, 1975; Voncken & Bögers, 2008).

## 8. Transparency in reporting

Overall, as clearly evident from Table 5, the present results only supported very few of our theoretically derived hypotheses and did not provide conclusive answers to the majority of our research questions. Even though the present study provides rather precise estimates as indicated by the small confidence intervals, we are aware that readers are used to expect a higher proportion of significant results and might be disappointed by the “story” this paper is telling. However, in light of intense debates on “false-positive psychology” (Simmons, Nelson, & Simonsohn, 2011) and the non-replicability of published results (Open Science Collaboration, 2015; Pashler & Wagenmakers, 2012), we decided to follow recommendations to “prioritize transparency over tidiness” (Simmons et al., 2011, p. 1363) by reporting all hypotheses and results independent of whether or not they have reached significance. Selective reporting and the aversion in our field to publish null-findings ultimately lead to biased estimates of the true effect in meta-analyses and impair our ability to falsify theories (Ferguson & Heene, 2012; Rosenthal, 1979). Hence, while this paper does not offer a fully coherent narrative, we believe that a transparent presentation of “imperfect” (yet methodologically strong) results ultimately better serves the purpose to advance our knowledge.

## 9. Conclusion

The present study aimed to provide more insight into the role of extraversion and social anxiety, two core interpersonal individual differences, in predicting social responses to status updates. Because posting as well as reading status updates is an integral part of many peoples' daily routines and (guilty) pleasures (Pring, 2012),

it is important to understand whether and how individuals depending on their personality might get socially “richer” online. Furthermore, the study provides insights into the important role of valence in this context. As pertinent to explorative research, the present study does not offer conclusive empirical evidence. However, as one of the first studies to explore predictors of different social responses to status updates, this study opens up a wide array of future research questions and provides a base for further studies. Moreover, an important contribution of the present study lies in applying a multimethod approach. It illustrates how the specific opportunities for data collection that Online Social Networking Sites offer can be used – namely the opportunity to objectively measure behaviors like status updating, liking, and commenting. Because of the many advantages of a multimethod approach like avoiding the risk of inflated effects due to shared method variance (Back & Egloff, 2009; Podsakoff et al., 2003) the study intends to encourage researchers to rely on many different sources of information to assess social responses to status updates.

## Declaration of conflict of interest

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

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## Appendix

Interpersonal Appraisal of Participants' Status Updates by Facebook friends: Original Items.

Wenn (*name of the participant*) ein Status Update schreibt, dann

...

... finde ich das nervig. (r)

... motiviert es mich, mit (*name of the participant*) in Kontakt zu treten (anrufen, Nachrichten schreiben usw.)

... glaube ich, dass (*name of the participant*) vor allem angeben möchte. (r)

... lese ich sie gerne.

... habe ich das Gefühl an ihrem/seinem Leben mehr teilzuhaben.

... frage ich mich, wen das, was sie/er schreibt überhaupt interessiert. (r)

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